Exercise 1.1.3

Suppose the following boxes are half-filled with water. Show the longest wavelength possible in each of the boxes.

In the electron sea model of metallic bonding, the electrons can be delocalized. They are no longer confined to a single atom, but can be spread out over multiple atoms. As a result, the wavelength of the electron increases. Because wavelength is inversely proportional to energy, as an electron's wavelength increases, its energy goes down. As a result, spreading electrons out over a group of metals results in a decrease in energy because of the wave properties of electrons.

• Delocalization is an important concept in chemistry.
• Delocalization is related to the "particle-in-a-box" concept: the longer the container, the longer the possible wavelength.
• By spreading out over a larger group of atoms, an electron can adopt a longer wavelength.
• An electron with a longer wavelength has a lower energy.

Some of the properties of metals can be understood, given a basic outline of the structure of a metal. We are going to look in more detail at exactly how metal atoms arrange themselves into solids, before we look at some of the ways metals form compounds with other elements.

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